DOCUMENT RESUME

ED 196 158 EA 013 227

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TITLE Preventative Maintenance.
PUB DATE 13 Oct 80
NOTE 6p.: Paper presented at the Annual Meeting of the Association of School Business Officials (66th, New Orleans, LA, October 26-30, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Cost Effectiveness; Data Bases; Efficiency; Elementary Secondary Education; *Equipment Maintenance; Equipment Standards; *Prevention; Recordkeeping; *School Business Officials; School District Spending; *School Maintenance

ABSTRACT

Boards of education must be convinced that spending money up front for preventive maintenance will, in the long run, save districts' tax dollars. A good program of preventive maintenance can minimize disruption of service; reduce repair costs, energy consumption, and overtime; improve labor productivity and system equipment reliability; handle repairs faster; and provide better training of maintenance personnel and management control of operating costs. The key ingredients necessary are an inventory of all systems and equipment, scheduling, adequately trained and equipped personnel, personnel supervision and control, recordkeeping, and monitoring of results. (Author/MLF)

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October 13, 1980

PREVENTATIVE MAINTENANCE

By James Migliorino

Preventative Maintenance means many things to different people. To one person preventative maintenance might mean service, to another preventative maintenance might mean checking, and yet another person may look at preventative maintenance as repair. I agree with the definition in a recent article of American School and University by Leif Skalleberg. He defines preventative maintenance as "A program in which wear, tear, and change are anticipated and continuous corrective action is taken to insure peak efficiency and minimized deterioration. It involves a planned and controlled program of systematic inspections, adjustments, lubrication, replacement of components plus performance testing and analysis." I would also like to add another key ingredient to any preventative maintenance program and that is keeping an accurate history.

Our Board of Education in Glendale, Arizona, often refers to preventative maintenance and preventative maintenance programs. However, I assure you that when we discuss preventative maintenance each person has their own definition. Preventative maintenance is one of those magical terms that just sounds good. Voting against preventative maintenance or talking against preventative maintenance would be like being against motherhood, apple pie and the American flag, and anyone in their right mind wouldn't be against anyone of those let alone a preventative maintenance program.

Another problem we encounter when it comes to preventative maintenance is that many people think of preventative maintenance and immediately saving money as a common factor. It takes a good selling job to convince a Board that spending money up front for preventative maintenance will save the district tax dollars in the long run.

If we can all buy into the definition I have just given you of preventative maintenance, the following benefits can be arrived from a good program. They are:

1. Minimized disruption of service. This means that we will have fewer complaints from Principals, staff and students.
2. Reduction of repair costs. Preventative maintenance will reduce or eliminate in many cases the need for repairs.
3. Reduced energy consumption. This will be achieved through improved operating efficiency.

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4. Improve system equipment and reliability. By extending the useful life of our equipment we will be protecting the capitol outlay assets of the district.
5. Improve maintenance labor productivity. This means we should be able to reduce the number of staff members needed for repairs if we have a good preventative maintenance program.
6. Overtime should be reduced through a more balanced work load.
7. Faster handling of repairs can be made because imminent equipment failure will be identified and limited in scope.
8. Better training of maintenance personnel because of the adequate data and history on the systems and equipment performance.
9. Better management control of operating costs.

To begin these benefits the key ingredients necessary are an inventory of all systems and equipment, scheduling, supervision and control, and adequately trained and equipped personnel, record keeping, and monitoring of results.

Preventative maintenance systems won't just happen. They must be promoted and school business officials should be at the forefront providing the leadership for this important program. One way to gain support for a preventative maintenance program is to wait for an incident such as your heating or air conditioning going completely out with the temperatures at 110^{0} if you live in Arizona or if it's Cleveland, Ohio it's 15^{0} below zero. These kinds of extremes somehow produce a greater eagerness to listen. As I pointed out earlier preventative maintenance and saving money are synonymous to many people. However, when you point out that they need proper equipment for diagnosis and performance testing along with trained personnel we often hear the story there is not enough money in the budget. That's when we have to begin to emphasize that if we don't start spending these funds up front that the cost to the district is really much higher over in the long run.

When asking for expensive equipment and the personnel to use it, be sure you point out that changing filters and lubricating the fan and the bearings, or tightening or replacing belts is simply a service check and the preventative maintenance really goes much further. In preventative maintenance you would take air and water flow ratings, static pressure readings, amperage readings and motor insulation tests. You would also check air and water temperatures. You would compare those readings against the performance specification from the manufacturer. Of course you would provide any corrective action needed to bring the system into compliance with those specifications.

Many times in making preventative maintenance checks one finds that the original installation by the contractor was often wrong. I know of a particular case where circulating fans were installed backwards and instead of blowing the air into the room they were actually sucking it out and this had taken place for several years before it was discovered. Another incident which happened to me personally involved a classroom that was always stuffy. The teacher in this particular room had complained for a number of years but the Maintenance Department was unable to solve the problem. Upon going back and pulling out the complete prints and specifications we discovered by tracing the entire system that an exhaust grill was placed into the room as specified. However, the duct work was never installed behind it and the grill was in the closed position, therefore there was no exchange of air in the room.

To begin a preventative maintenance program the following items must be included.

1. You must know what equipment is involved.
2. You must know the location of the systems and the equipment.
3. You must gather all pertinent data on the equipment such as name plate data, rpm, horsepower, amperages, and manufacturer's operating curves for fans and pumps.
4. You must obtain operation and maintenance manuals for all the equipment and systems in your district.
5. You must compile performance specifications for all these systems and equipment.

Now I realize that this is a large chore but to be operating our multi-million dollar plants today we should have a data bank for all operating equipment in the school district.

Once you have gathered the above data to begin your program then you must ask the following questions.

1. What has to be inspected, tested and serviced?
2. How often should this be done?
3. How long should the job take?
4. When was the job done last?
5. How much work is required now?
6. How long can maintenance be deferred?
7. What is the system and/or equipment used for?
8. When can it be tested and inspected, and if service is needed when can it be done?

For instance, is it really possible to do a complete PM on an air conditioner when it's needed for cooling the classrooms?

I suggest that you develop a 5 x 7 card file for each piece of equipment in answering these questions related to that piece of equipment. By doing this we begin to develop a history of the equipment and systems in our districts. As the manager you must be reminded that it would not be practical nor feasible to develop a comprehensive program for every little piece of equipment. You as the manager would have to make cost analysis and determine whether or not performing preventative maintenance on a piece of equipment or system would truly be cost effective.

One of the most important aspects of a good preventative maintenance is the separation of preventative maintenance and repair. To many as I mentioned earlier, preventative maintenance is repair, and I need to point out that does not fit our definition of preventative maintenance. It might be that you use your service repair forms and your maintenance workers to do preventative maintenance, but preventative maintenance is anticipating problems not going out to fix something that is broken.

I would suggest that you assign preventative maintenance to the most qualified people on your staff. In many cases you will find them eager to begin this type of assignment rather than just responding to emergency crises. Of course the size of your district will determine the size of your preventative maintenance crew. In some cases it will not be practical to have your own crew and you may wish to hire preventative maintenance from an outside contractor. This will take a super sales job on your part because, again your Board may be reluctant to spend money for something that hasn't yet broken down.

In setting up a preventative maintenance program be careful that your maintenance department does not perceive maintenance as a threat. Many times they have gotten used to just responding to crises over the years and reacting to preventative maintenance in an unfavorable manner as something devised by hot shot engineers that really don't know what they're doing. The monitoring of preventative maintenance usually will fall on the Maintenance Supervisor or Business Manager. Supervision and control can be made much easier through the use of computers where possible. If not be sure that there is at least a system whereby 5 x 7 cards and a complete history is kept on all major equipment and systems.

In monitoring the work of the individuals performing the testing be sure to allow enough time for the technicians or mechanics to analize and rectify each

situation. Do not set unreasonable time limits or restrictions. You should keep an accurate record of the total cost involved in each case and I suggest you do this either on the 5 x 7 cards or through the use of your computer if you have one.

A word of caution regarding using two or three employees in teams to do preventative maintenance work. Be careful that one employee does not always do the inspections while the other one records and observes the operation. By alternating the mechanics you'll have a much better all around staff to do the work rather than allowing each person to fall into their own rut. You will also decrease your possibilities for errors.

In performing their work the mechanics should always be alert to anything that might lead to trouble later on such as loose support brackets, or a duct that is being damaged by vibrations. Again, this is part of the anticipation that we discussed earlier. It's this anticipation that will save dollars in the long run. Many times skilled mechanics can make minor adjustments or suggest modifications that will save dollars later on.

Finally, I must point out that it takes time for a program to become established. People have a tendancy to want to revert back to what has worked for them in the past such as responding to a crisis, or an equipment failure rather than a systematized planned approach to maintenance. In order for the program to succeed you have to resist the temptation to return to the old ways. Payoff periods for preventative maintenance range from months to years, but it's long range planning and costing that separates the alert Business Manager or Maintenance Supervisor from the ordinary ones. I hope that I have given you food for thought that will replace crisis management with long range and short range planning involving preventative maintenance systems.